F·A·A·M facility for airborne atmospheric measurements

FLIGHT FOLDER

Flight No. **B431**
Date: 26 Feb 2009
Take Off: 10:10:37
Landing: 13:22:36
Flight Time: 3h 11m 59s

Campaign: APPRAISE-Clouds: mixed-phase cloud studies
Operating Area: Over and to the west of the Chilbolton radar facility. Area Alpha.

POB	Position	Name	Institute	Logs y/n
1	Captain	Alan Foster	Directflight	
2	Co-pilot	Ian Ramsay-Rae	Directflight	
3	CCM	Dawn Quinn	Directflight	
4	Mission Scientist 1	Keith Bower	Manchester University	
5	Flight Manager	Mo Smith	FAAM	
6	Core Chem	Stephane Bauguitte	FAAM	
7	Cloud Physics 1	Phil Rosenberg	FAAM	
8	Wet Nephelometer	Dave Tiddeman	Met Office	
9	AMS	Jonny Crosier	Manchester University	
10	Manchester Cloud	James Dorsey	Manchester University	
11				
12				
13				
14				
15				
16				
17				
18				

The following log sheets are not available for this flight :

Log	Reason
Pre-flighter log	No log available
Cloud Physics In Flight	Awaiting confirmation of whether a log was created
Cloud Physics Processing	Processing yet to be completed.
Core Chemistry / TDLAS	No In Flight log except in cases of instrument problems
CVI	Awaiting confirmation of whether a log was created
Manchester Cloud	Manchester Cloud operator does not create a log sheet
AMS log	AMS operator does not create a log sheet

Document control

Revision	Date	Author	Comments
r0	30 Dec 2009	Doug Anderson	Initial version missing the above noted logs
r1			
r2			

Digital video recordings in avi format:

faam-video-dfc_faam_20090226_r0_b431_103208_1hz.avi
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faam-video-dfc_faam_20090226_r0_b431_113614_1hz.avi
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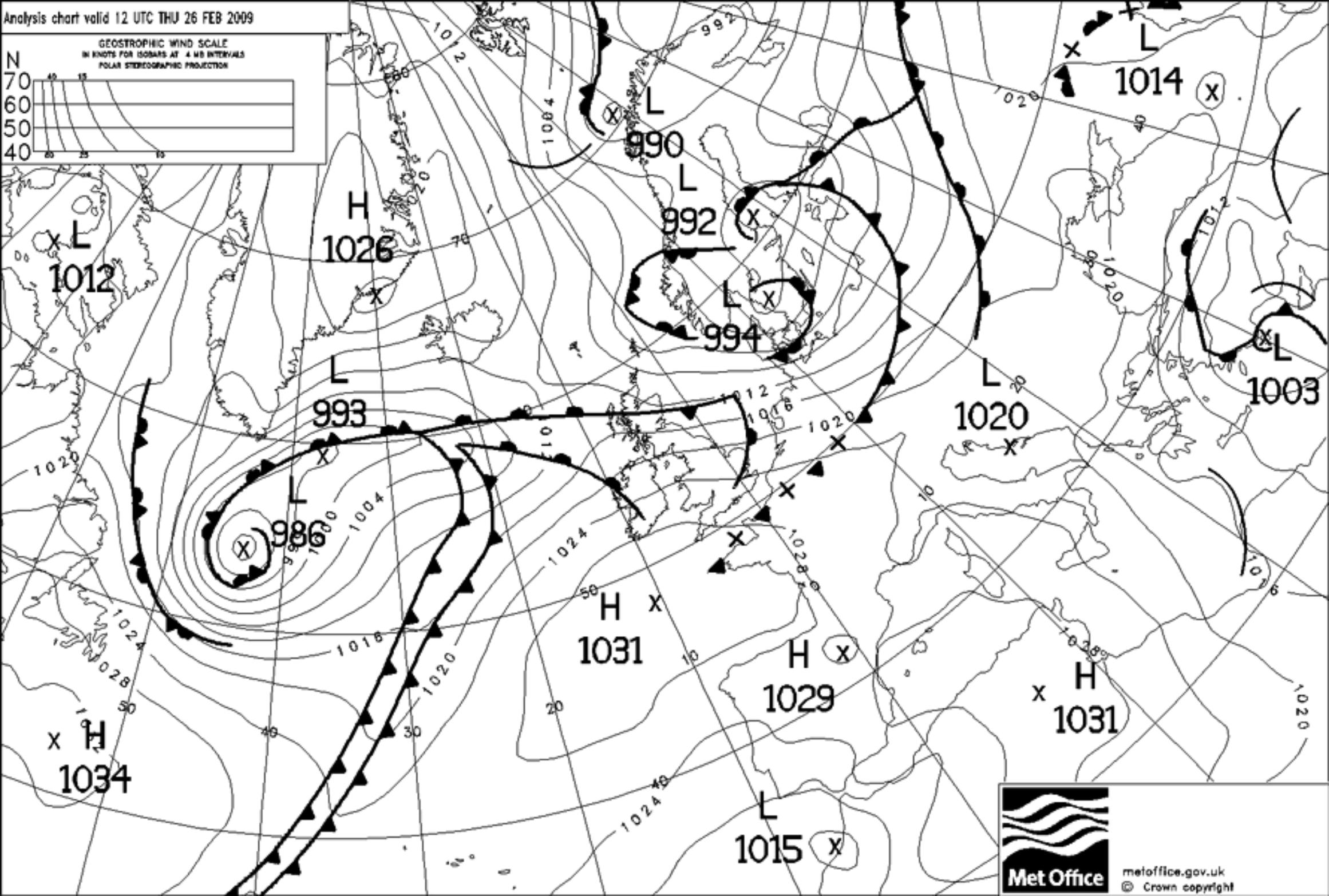
FLIGHT SUMMARY

Flight No B431
Date: 26 Feb 2009
Project: APPRAISE CLOUDS
Location: Chilbolton

Start Time	End Time	Event	Height (s)	Hdg	Comments
091050		Start-Up	0.08 kft	308	52'04.36N, 0'37.48W
100503		ASP	0.08 kft	175	Open
101037		T/O	6.2 kft	046	Cranfield
102958	103836	Profile 1	10.0 - 4.0 kft	170	
103841	104828	Profile 1	4.0 - 0.11 kft	152	50' ovhd Boscombe
105037	110232	Run 1	2.2 kft	257	
110237	112158	Profile 2	2.2 - 21.0 kft	206	
112421	113623	Run 2	19.0 kft	262	
113721	113745	Run 2	19.0 kft	055	
113956		Video	19.0 kft	294	Break of 3 mins
114156	114303	Profile 3	19.0 - 18.0 kft	271	
114304	115459	Run 3	18.0 - 17.9 kft	262	
115500	115602	Profile 4	17.9 - 17.0 kft	319	
115602	121154	Run 4	17.0 kft	076	
120641		Event	17.0 kft	057	Ovhd Chilbolton
121154	121315	Profile 5	17.0 - 16.0 kft	266	
121315	122443	Run 5	16.0 kft	266	
122451	122545	Profile 6	15.9 - 15.0 kft	263	
122545	124301	Run 6	15.0 kft	003	
122648		Event	15.0 kft	056	Wing tip vortices
123716		Event	15.0 kft	056	Ovhd Chilbolton
123940		Event	15.0 kft	203	Lost all video
124301		Profile 7	15.0 kft	266	and all science 230V power

Abort mission, return to base

132236 Land at Cranfield


Analysis chart valid 12 UTC THU 26 FEB 2009
GEOSTROPHIC WIND SCALE
IN KNOTS FOR ISOBARS AT 4 MB INTERVALS
POLAR STEREOGRAPHIC PROJECTION
N
70
60
50
40
L 1012
H 1026
L 990
L 992
L 994
L 1014
L 1003
L 993
L 986
H 1031
H 1029
L 1020
H 1031
H 1034
L 1015
1020
1016
1012
1008
1004
1000
996
992
1024
1028
Met Office
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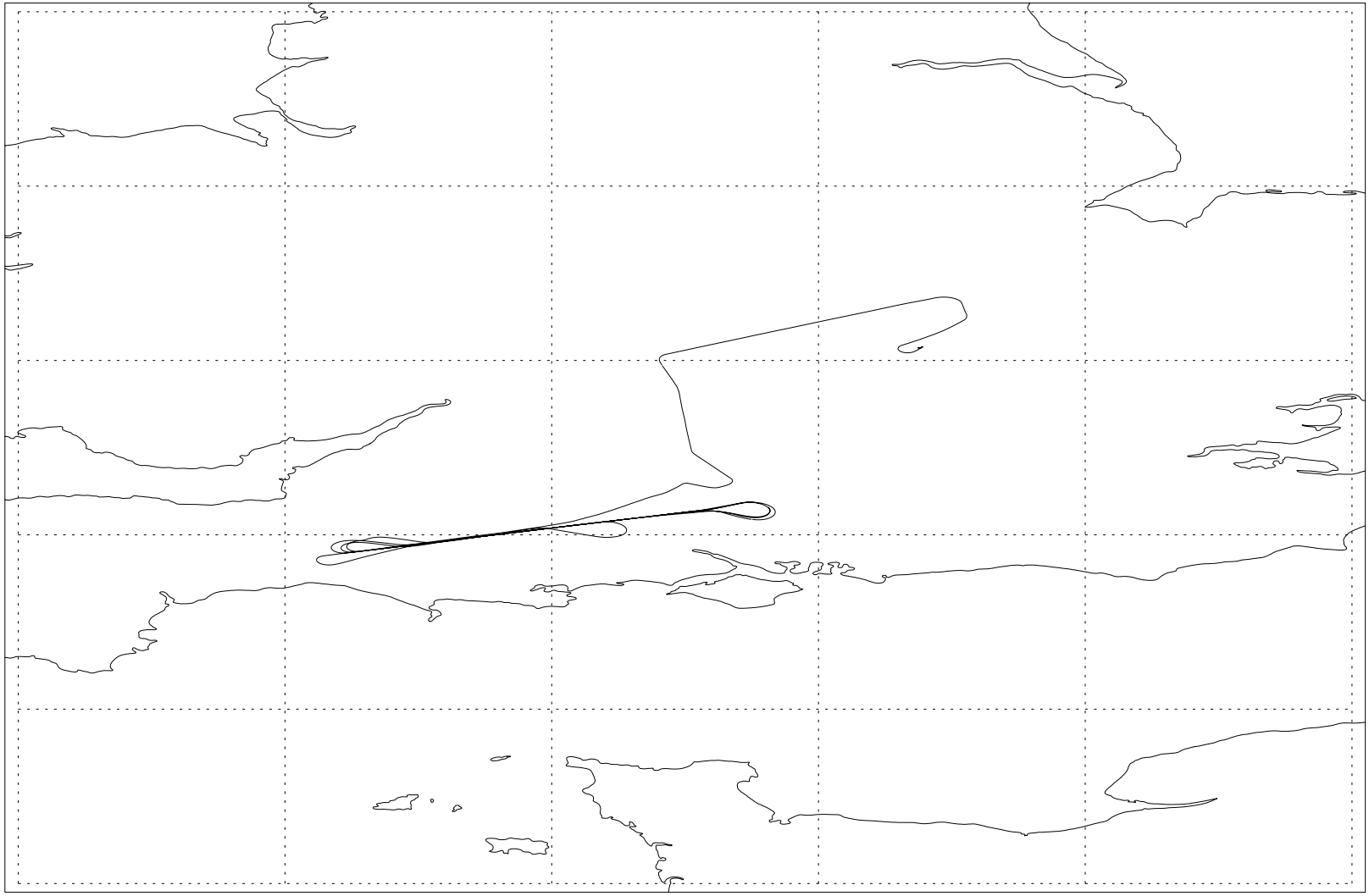
B431 08:18:09–12:43:14

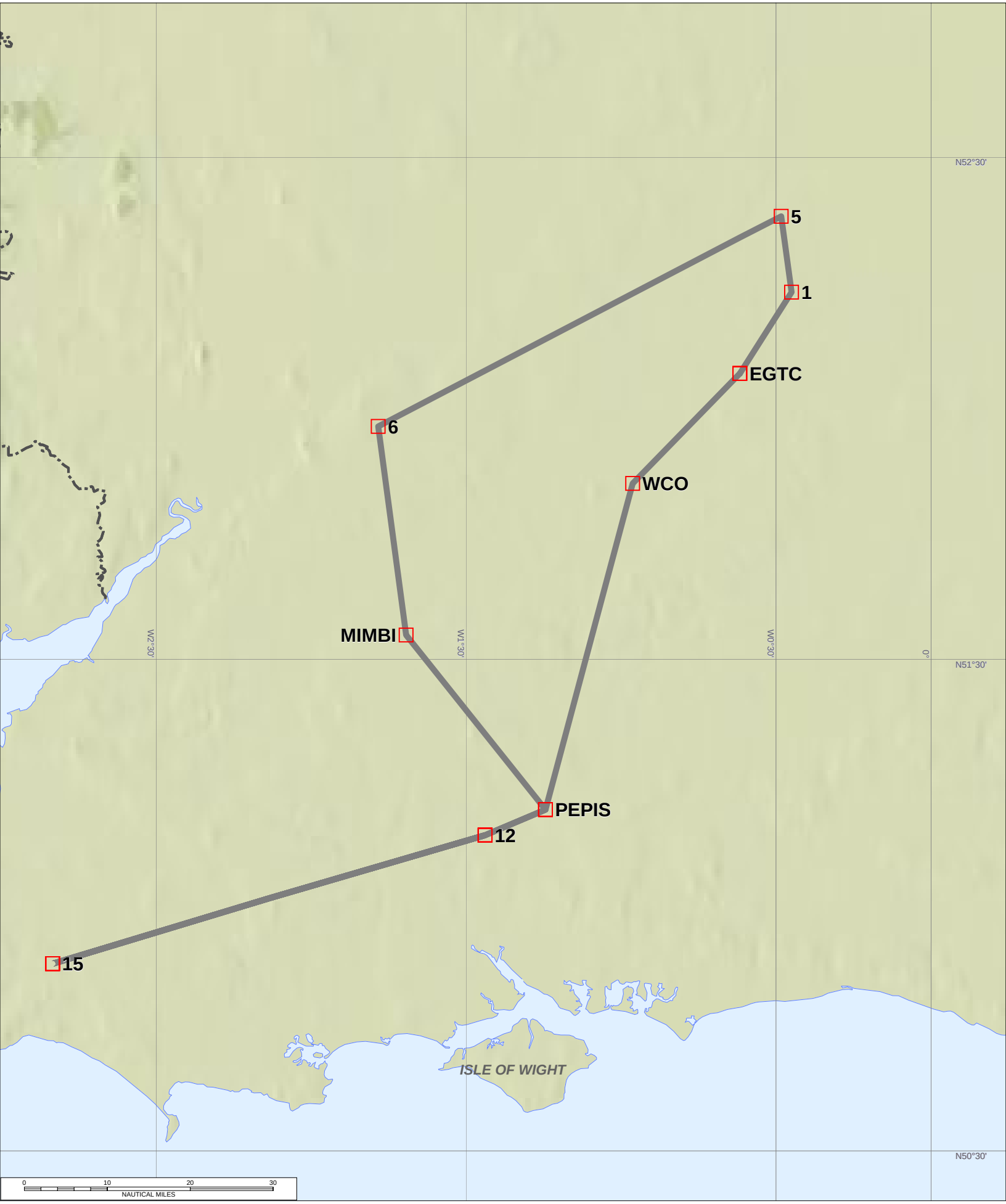
GLNG_PARA0581,GLAT_PARA0580



Wed Mar 4 15:19:42 2009

Pilot: Alan Foster
NavData Cycle 2009-2 Expires: Thursday, 12 March 2009.
Scale: 1:1037052 (1 inch = 14.22 naut mi). Printed on 25 Feb 2009

54774946
FliteStar 9.4.3.0



Sortie Brief: APPRAISE-Clouds: mixed-phase cloud studies
Date: 26 Feb 2009
Plan A (double flight) B431a&b: t/o 10:00z land (Exeter 13:00) t/o 4:30 land 18:30
Plan B (single flight) B431: t/o 12:30 land 18:00
M.Sci: Keith Bower

Sortie Aims: To measure ice and liquid-phase microphysical processes in frontal and other clouds in association with the Chilbolton radar facility.

Sortie Location: Over and to the west of the Chilbolton radar facility. Area Alpha**.**

Sortie Summary: Perform a series of runs at a series of altitudes below cloud base (if possible), within and above the cloud, along the azimuth that is being scanned by the radar. Information on the run orientation and altitude to be flown will be provided by scientists at Chilbolton using VHF radio (call-sign "Radsearch"). Where the radar identifies a small-scale feature of interest, the aircraft may abort a long leg in order to turn to re-penetrate it. Where either the aircraft or radar identifies a particular horizontal layer of interest, the aircraft may fly a sawtooth pattern so as to provide a sequence of profiles through it. It is desired that the aircraft flight legs start/finish in the Chilbolton overhead. This benefits the validation of vertically-pointing radar/lidar retrievals of supercooled cloud layers. This requires turns to be done within controlled airspace and so may limit the number of occasions that this is possible.

Sortie Detail :

a) Take off & climb to transit to operating area at Chilbolton.
b) When at suitable location descend from transit altitude to 1000ft agl, or to lowest altitude allowed by operating restrictions. Fly 10min **clear air** leg in vicinity of Chilbolton.
c) Perform a profile ascent at 1000ft/min along the azimuth and through the cloud system up to FL330* or to above cloud top, whichever is lower.
d) Fly a series of 40-60km level flight legs along the azimuth scanned by the radar at altitudes defined by the radar or as determined from previous profile. Ideally, just above cloud base, throughout the cloud, just below and just above cloud top. Duration of each leg ~10 minutes. Legs should extend over Chilbolton (AMS will sample off CVI inlet in and out of cloud. Filters to be exposed on out of cloud legs only).
e) ATC permitting, where the radar identifies a feature of interest or one that is penetrated by the aircraft along any leg, the leg may be interrupted to fly one or more butterfly patterns. Each butterfly consists of a minimum of two minutes straight/level that includes penetration of the feature followed by turns that allow re-penetration of the feature during the reciprocal part of the pattern.
f) Where a defined layer of interest (such as a shallow layer of supercooled liquid water) is identified by the aircraft or radar, the long leg may be flown as a sawtooth leg with ascents/descents at 1000ft/min, extending 1000ft above and below the layer level (M.Sci may request level segments of 1 minute).
g) Repeat items d) to e) as long as flight endurance or cloud conditions permit.
h) End with below-cloud clear air aerosol leg (10 min) if possible, before recovering to destination airfield.

PROJECT BRIEF: APPRAISE-Clouds – mixed-phase cloud studies

Scientific Aims: The purpose of this project is to obtain detailed microphysical measurements in stratiform cloud systems, altocumulus clouds, wave clouds and cumulus clouds within the temperature regime in which ice particles will likely co-exist with liquid (typically 0 to -30C).

The flight plans are designed to characterise the aerosol above and below the cloud and infer aerosol fluxes into the cloud layer by combination with the vertical wind measurements and the microphysical characteristics within the cloud layer.

Constant altitude flight legs of approximately 50 km (10 minutes flying) will be made:

• In the boundary layer to measure the aerosol size distributions (from 10 nm to 100 um), CCN, aerosol composition from 30 nm to 1 um using the ToF AMS; larger particles and non-volatile material such as refractory material will be measured using EDAX analysis of filter samples.

• Near cloud base within cloud to measure the cloud droplets that have been activated from CCN, interstitial particles and larger particles that have fallen from cloud top. In addition the onset of ice will be observed using the CPI, CAPS and 2-D probes in cloud.

• Middle of the cloud passes will be made at temperatures where key processes will be expected to be initiated (-6C to -9C) for the Hallett-Mossop process or around -15C where fragmentation of dendritic crystals may be important.

• Near cloud top and within the cloud to measure entrainment and aerosols within entrained eddies and ice particles within the cloud; in colder clouds ice initiation will occur in this region.

• Above the cloud to measure the properties of aerosol particles that can potentially be entrained into the clouds.

In-situ measurements from the aircraft are performed in close coordination with the CAMRa radar and lidar facilities at Chilbolton, Hants.

Weather conditions: Stratiform, or altocumulus clouds lying over and to the west of the Chilbolton radar facility. This may or may not be generating precipitation at the surface. It is particularly desirable if the mean wind direction lies between about 220 and 280 degrees. This allows the aircraft to fly legs along the radar beam whilst staying closely parallel to the mean wind direction.

Key instruments and their operation.

Basic meteorology

- Rosemount temperatures, GE hygrometer, CR2
- GPS, GIN, turbulence probe – When in supercooled liquid water, Flight Manager or PIs should monitor turbulence probe calibrated differential pressures for signs of icing (cessation of variability on signal).

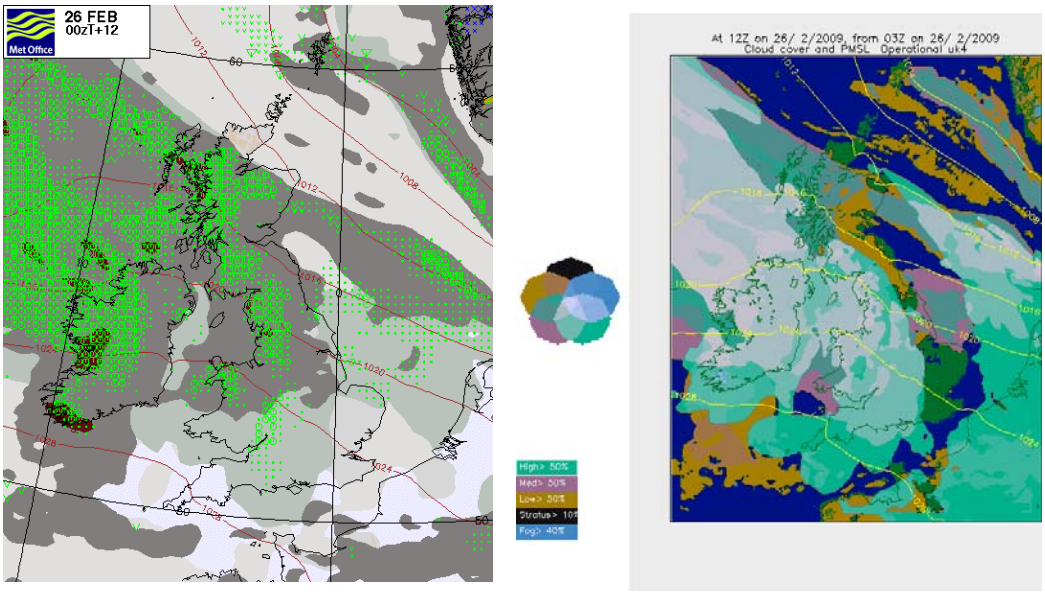
Cloud/Aerosol Physics/Chemistry

- FFSSP, 2DC, 2DP, PCASP, CDP. Normal monitoring to ensure correct operation. Operator should note particular features of interest eg. high concentrations, appearance of pristine ice crystal habits, appearance of large drops (>100micron) in 2D imagery when above freezing level.
- 2DS, CAPS and FSSP – as above
- J-W LWC and Nevzorov LWC/TWC. Where a run is only partially in cloud and is starting in clear air, these should be zeroed/calibrated and a note made in the Flight Manager's log.
- TWC. If possible, a profile in clear air is desirable for calibration purposes.
- AMS, SMPS/WCPC (- to sample off Rosemount inlet)
- Filters

Mission Scientist Debrief: APPRAISE-Clouds: mixed-phase cloud studies:
Flight Number: B431, 26th Feb 2009 (Take-off 10:10z, flight aborted, landed 13:22z)
Mission Scientist: Keith Bower

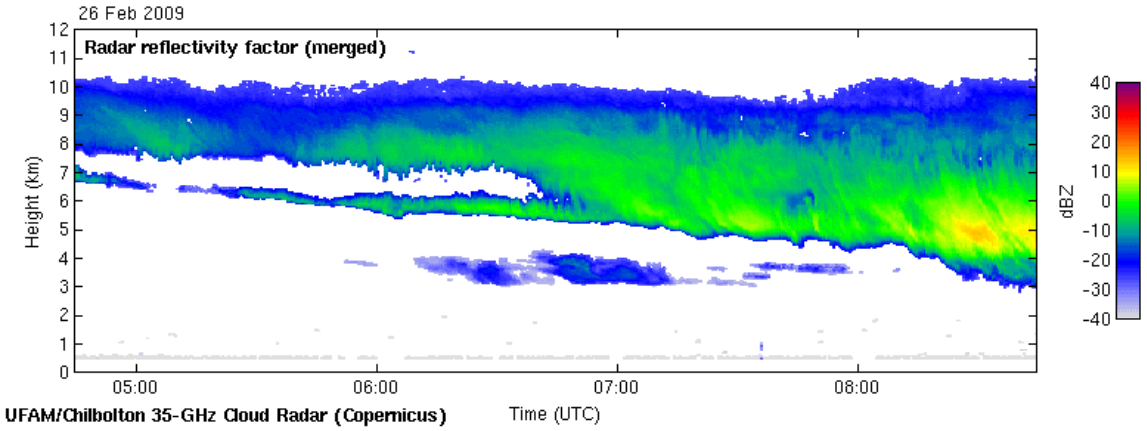
Sortie Aims & operating area: To measure ice and liquid-phase microphysical processes in frontal clouds in association with the Chilbolton radar facility.

Weather conditions: The surface pressure pattern in the days leading up to the 26th had seen a low pressure area travelling slowly eastwards across the Atlantic, passing just to the south of Iceland during the early hours of the 25th. Up to this time most of the southern UK had been sitting under a high pressure region which was gradually forced southwards over southern England by the approaching low on the 25th when the area of high pressure then extended from the SW approaches in the west to cover France and central Europe in the east. Since the time at the start of the week (on Monday 23rd) when a warm front had lingered over the east coast of the UK, the high pressure kept the UK clear of fronts until a cold front approached from the NW on the 25th and passed southwards over the whole country by the end of the day as the area of low pressure passed to the north of Scotland to be situated just to the west of Norway by midnight on the 26th. At this time the front sat along the south coast of England and gradually dissipated during the early hours. However, a warm front approaching the UK from the NW was forecasted to pass over central and northern UK during the first half of the 26th. Substantial cloud cover associated with this and another frontal system approaching Ireland from the west later in the day was forecasted by both ECMWF and MetOffice models (4km operational model, the NEA operational model and the mesoscale model).

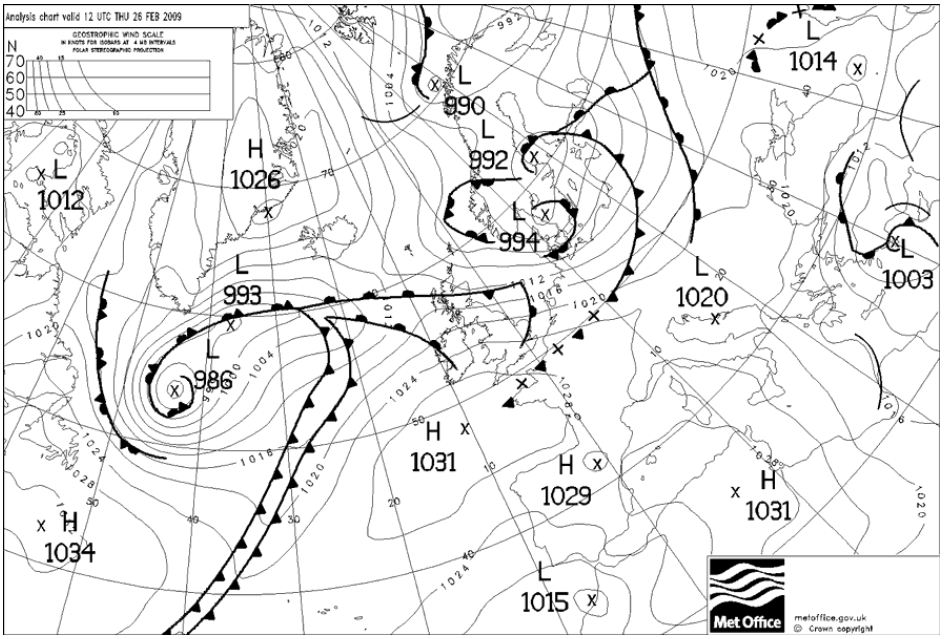


Figures 1 (left) and 2 (right) above show the 1200z predictions from the MetOffice mesoscale model (midnight run 260209) and 4km operation model (1500z run 250209) respectively. The mid grey tone in the former and the lighter blue tone in the latter indicate the presence of mid level cloud at this time.

The MetOffice 4km model (for 1200z Fig 1) predicted there would high level cloud present throughout the day with mid level cloud present from about midday onwards. The mesoscale model (for 1200z Fig 2) had mid level cloud present from around 0900z until at least 1800z. Based on this information a takeoff time of 10am was set to enable this to slip to later times if required on the day in order to catch the optimal conditions for the flight. Figure 3 below shows the time series of radar reflectivity factor for the 35GHz vertically pointing cloud radar at Chilbolton for the morning of Feb 26th. It can be seen that at 9am there was substantial mid and high level cloud present, so the take-off time of 10am was adhered to for flight B431. Figure 4 shows the synoptic situation during the flight at 1200z on Feb 26th and indicates the position of the warm front (slightly further south than originally predicted) and the dissipating cold front at this time.



Figures 3 : Time series of Radar reflectivity factor for the 35GHz vertically pointing cloud radar at Chilbolton up until 9am on Feb 26th .



Figures 4 : The surface pressure chart for 1200z on Thursday Feb 26th .

Summary of the flight: Following take-off, the aircraft ascended to FL100 to transit to the operational area over Chilbolton (CH). During the ascent it was reported that large lumps of ice were falling out from a cloud layer above. At the start of the transit (696mbar, -7.81 °C) the aircraft entered into the base of that cloud layer, and then progressed into thicker cloud during the progression westward. CPI reported that the ice crystals were huge and "too big to see properly", but CIP-100 was able to see more of them. At the end of the transit, following a left hand turn a profile descent P1 from FL100 (-5.91°C) to enter the zone on the approach to Chilbolton and the Boscombe Down airfield, revealed a cloud base at FL94 (711mbar, -4.93°C). The descent rate was then speeded up at this point following a request from ATC. At 4.8kft a layer of stratus was seen to the south with an estimated CT of ~5kft, but there was no cloud immediately below. PCASP concentrations were low <20 cm^{-3}, the CPC saw ~170 cm^{-3} and CAS concentrations were also "low".

In the descent to 50ft for the missed approach at Boscombe Down airfield, PCASP concentrations increased to 240 cm^{-3} in the boundary layer (BL top ~1.2kft on QNH 1025mbar) and AMS reported interesting CPC structure and reasonable loadings of ammonium, nitrate, organic and sulphate. In the ascent (P2) to the west of Boscombe, puffs of cloud were encountered at 2300ft but at 2500ft (935mbar/2.1kft, 2.91°C) at the start of SLR R1, the aircraft was above CT. At this time an update from Chilbolton reported deep ice cloud overhead between 2-7km (6.5-23kft) with a layer of thin cirrus between 8-10km (26-32kft). RHI scans suggested this thinned out to the west, but that there was a strong midlevel signal out to 100km west. Based on this it was decided to investigate these layers by undertaking a profile ascent (P2) through them in the return leg towards Chilbolton. A further update from the radar reported a deepening dry slot over CH between the cirrus and midlevel cloud, the CT of the latter decreasing to 5.5-6km (18-19.5kft) and CB lifting to 2.5km (8.2kft). However, scans out to the west revealed a thickening of mid-level cloud at 45-60km range. At FL90 (724mbar, -2.07°C) CPI reported seeing ice. Information from Radsearch suggested the midlevel cloud included signals of supercooled water. At FL131 (614mbar, -11.06°C) the aircraft anti-icing system detected icing, while CPI reported mixed phase conditions. In order to complete the profile in one go, the aircraft continued the profile by turning to head west along the outbound radial. At FL175 there was a significant increase in brightness, and CT was encountered at FL195 (475mbar, -22.04°C). The profile was terminated at FL210 (446mbar, -25.13°C) and a brief profile (P3) back down the FL190 (484mbar, -20.86°C) undertaken to what was previously just in CT. R2 was started just before the turn and continued inbound to CH as an SLR. Radsearch reported a supercooled water layer at 6km above CH (19.6kft) above a thick ice layer with CB at 2km. There was a cirrus layer above this at ~8-9km. R2 was actually carried out above CT but CPI still saw ice crystals presumeably falling out from the Ci above. Core cloud queried whether it was seeing bullet rosettes (BR), and in general a mixture of small irregulars, columns, bullet rosettes and possibly water was observed. In the turn at Pepis (after passing overhead CH) it was reported than the ice previously observed on the probes was a little thinner than before. Radsearch reported the lidar was seeing liquid in fall streaks at 3.5-4km altitude 80km west of CH. The RHI was seeing strong returns from ice streaks.

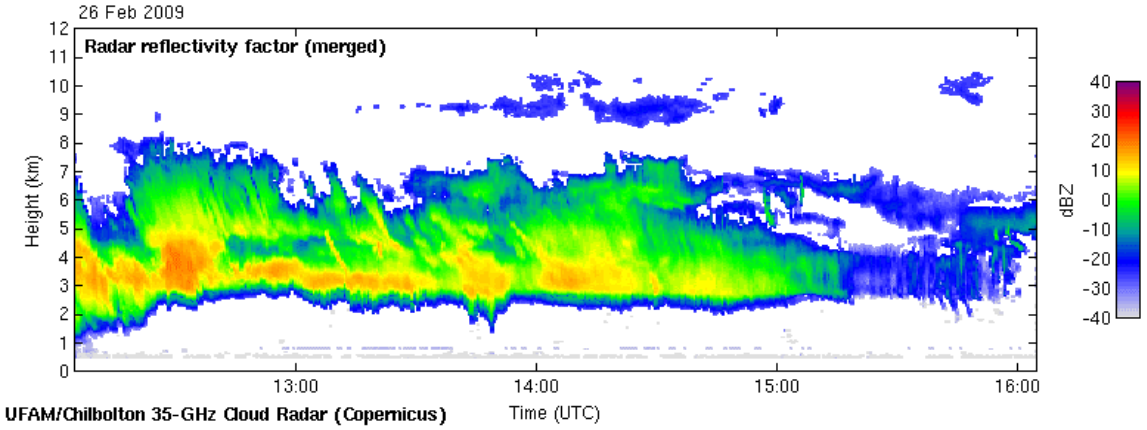
Based on the information from the Chilbolton radars and lidars it was decided to carry out reciprocal SLRs at descending levels outbound and inbound to CH. The first outbound leg was started following a profile descent to FL180 (505mbar, -20.48°C) after passing CH. It was expected that liquid water would be observed, and core cloud reported a mixture of ice and water. CPI disputed the presence of liquid water, and indeed the aircraft anti-icing system was not triggered. Chilbolton reported seeing lots of specular reflection, but also CTs (containing water) at -20°C, together with intermittent seeding from above. RHIs revealed fall streaks containing water at 3.5km (11.5kft) and possibly an evaporating ice signal at 0-20km west. R3 ran out of cloud mid run, but CPI reported seeing precipitation falling from above so R3 was continued.

Towards the end of R3 (505mbar, -19.23°C), cloud was again encountered, and this time the aircraft anti-icing system was triggered, and CPI saw water drops while 2DC saw ice particles. The droplet radius observed by CPI (CAS?) increased from being < 10μm to >10μm at the end of R3. FSSP reported a peak liquid water signal of ~0.3g/m^3 and generally a value of around 0.1g/m^3. Following a profile descent P4 (in the turn) to FL170 (526mbar, -17.83°C) inbound SLR R4 was started. At this time there was an estimated 5mm thick layer of ice build up on the port pylon. However, core cloud reported that signals from many probes had suddenly gone to zero (with speculation this might have been due to icing). The aircraft itself was suffering from heavy icing now. The engines lost sync because of ice build up on the fans, and there was a significant ice build up along the leading edges of the wings. This presented a conflict between the need to descend to lower levels to clear the ice build up on probes, and a desire to continue measuring these rather incredible clouds. The non-core microphysics probes were still functioning well, so the decision was taken to continue measuring for a while.

As on the previous runs, R4 ran out of cloud for a brief period midway along the radial but re-entered cloud for the run in to CH. The latest report from Chilbolton indicated ice still falling from Ci above into a now thicker mid level cloud layer, with CT at 5-6km (16.5-19.5kft), CB ~1km (3.3kft). Supercooled water was reported at the 3km (10kft) level. After passing over CH outbound, a profile descent (P5) down to FL160 (547mbar, -15.6°C) was carried out and outbound SLR R5 started. As before, R5 was above CT briefly mid run. Here CPI reported seeing lots of small irregulars but probably no liquid drops. However, 2DC saw “doughnuts”, but the aircraft anti-icing system did not trigger an icing alarm. Back into cloud CPI soon described flying through a “bag full of liquid water”. There was also a very significant build up of ice on front of the CPI, and an estimated 1cm of ice on the PCASP. Chilbolton reported CB having lifted to 2km and the top of the ice layer to 7km (23kft), with the layer possibly thinning to the west. The supercooled water feature continued to be observed in the cloud at 3km (10kft), but there was no obvious precipitation.

At the SW end of the radial, profile descent P6 to FL160 (570mbar, -12.94°C) was carried out in the turn. R6 inbound to Chilbolton again flew through the cloud free region mid run, and then back into cloud. This may have been the back edge of the mid level cloud. Chilbolton again reported the RHI scan had seen a boundary, now at 20km range, and the same supercooled layer as before at 3km altitude. After passing overhead at CH at the end of R6, the 2DS stopped working. At this point a decision was taken to do a fast

descent after the turn to try to remove the accumulated ice build up on various probes and hopefully to get them working again. During the descent Horace screens froze up so there are no details of CB height, T, p etc. However, after passing through CB there was a major loss of 230V power, and hence of instruments like FSSP, core cloud and core chemistry, as well as the HORACE central logging system. Attempts to reset the appropriate 230V circuit breaker failed, and so the science flight was suspended, and an immediate return to Cranfield undertaken. The hope was that if the problem could be fixed, a second short flight could be made to continue measuring the cloud, which as can seen from the radar reflectivity times series (for the period 12:00-16:00, Figure X below), persisted in a major way until around 15:30z. Unfortunately the 230V power problem could not be sorted out in time and in addition another aircraft fault had occurred during the RTB (failure of tail anti-icing system) which grounded the aircraft for the rest of the day.



Figures 5 : Time series of Radar reflectivity factor for the 35GHz vertically pointing cloud radar at Chilbolton from midday to 16:00z on Feb 26th .

Notes on instrumentation:

All instruments worked throughout the flight until issues relating to ice build up or the loss of 230V power occurred (which for some instruments was instant – for other running on UPSs was gradual). The latter affected core cloud probes and FSSP first, and then gradually other probes such as 2DS and the core logging system. The icing problems affected the turbulence probe first, and then the pitot tubes on CAPS and CIP probes, and probably then had an increasing effect on the inlets of other pylon mounted probes. The ice on the CPI nose was the most ever seen, and around 3cm of ice built up on the PCASP exhaust. The only real instrument issue concerned data communications on the wet nephelometer at the start, overcome by redirecting signals to the dry nephelometer system

Mission Scientist's Log [APPRAISE-CLOUD]

(power failure - aborted)

Flight No B.431 **Date** 26/02/09 **Name** KN BOWER **Page** 1 **of** 8

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
					(1022mb T +6°C → 300 ft)
9 54.19	(KNB)	→ 9.56 45			Engine Start 4 → 1
9.57.04	"				Power change over
9.59.51	"				Taxi
10.01.20		→ 10.05.02			Hold — Taxi (250/ 14kts)
10.10.57					Rolling
10.11.24	T/O				T/O 8/8 cloud cover — high CB
					Large lumps of ice falling out from aircraft
10:17:40	= 10 :	18.29 ICNB	(749s fast)		
10.18.33	Transit	FL100	247	52°18'/0°30'W	Into Cloud 696mb -7.81°/-8.46°C 12m/s/265°
					Just into CB → cloud proper
					Huge lumps ice ... too big to see properly.
					(On p reading 1013mbar)
					4-8 km strokes ~ 20 miles ago
10.28.06	Transit	FL100	245	52°0'/1°24'	PIP - seeing more
					696mb; -6.02°/-8.27°C 11m/s/265°
10.29.00	L Turn	FL100	244	52°0'/1°30'	LHT 696mb -5.91°/-8.88°C 12m/s/264°
10.29.58	P1 start	FL100	171	51°54'/1°30'	696mb -5.98°/-8.23°C 9m/s/271°
10.30.30	P1	9.4kft	171	" / "	ATC Expedite descent - inc rate descent rate
					(out of Cloud) 711mb -4.93°C/-6.78° 10m/s/284°
10.33.05	P1	4.8kft	179	51°42'/1°30'	846 mb, 0.95°/-6.92°C 10m/s/300°
					Starting to S of us ~ CT's 5000ft or so
10.33.52	P1 int	4000ft	180	51°36'/1°30'	874mb, -0.87°/-3.25°C, 12 m/s/307°
					(Cold. Brine) - No cloud below 5000 ft.

[PCASP - low < 20 cm^{-3}
CPC reading ~ 170 cm^{-3}
CAS also low.]

9.15

Mission Scientist's Log

Flight No B431 **Date** 26/02/09 **Name** K.N. Bower **Page** 2 **of** 8

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
10.36.57	Turn	4kft.	160°	51°24'/1°24'	ATC require a turn. 874mb -1.23°/4.36° 11m/s/295°
					[270-10kt] Code blue
10.38:41	PI rec	4kft	152°	51°18'/1°18'	Recommence 874mb -0.71°/4.79°C 10m/s/299°
					QFE = 1011mbar.
10.39.39	PI RTurn	2.9kft.	152°	51°18/1°15'	RHT 905mb 1.35°/3.75°C 9m/s/306°
10.40.41	PI int	2000'	244°	51°12'/1°15'	RHT. 939mb 2.96°/-1.91°C 12m/s/292°
10.42.38	level	2000'	296°	51°12'/1°24'	LHT. 935mb, 2.87°/-2.36°, 11m/s/292°
10.44.28	level	2000'	228°	51°12'/1°30'	Gentle RHT 939mb, 2.63°/-1.65°C 9m/s/291°
10.45.26	Descent PI	2000'	245°	51°12'/1°36'	940mb, 2.95°/-2.18°C 10m/s/294°
					[280/11 kts]
10.47.01	Desc PI	1000'	239	51°6'/1°36'	972mb 4.3°/0.76°C 9m/s/274° (1.1kft)
10.47.44	PI	500'	238	51°6'/1°42'	990mb 5.24°/3.12°C 7m/s/267 (0.6kft)
10.48.28	Plevel/P2	50ft	235	51°6'/1°42'	0.1kft/1009mb 6.78°/3.73°C 5m/s/256°
10.49.18	P2	500	236	51°6'/1°42'	0.5kft/992mb 5.43°/2.83°C 7m/s/266° QFE
					(QNH 1025mb Boscombe) set.
10.49.55	P2	1500	237	51°6'/1°48'	1.1kft/970mb. 4.03°/1.38°C 10m/s/279°
					Puffs cloud at 2300ft
10.50.57	P2/R1 st	2500ft	243	51°0'/1°46'	935mb/2.1kft 2.7°C/-2.21°C 12m/s/296°
10.52.59	R1	2500ft	255	51°0'/2°0'	Just abv CT 935mb/2.1kft 2.91°/-1.91° 13/295°
					PCASP 240 cm^{-3} 50kt approach
					(BL ~ 1.2kft)
					CAS - plate peaking at 20 cm^{-3} on
					AMS - interesting structure + CPC
					(Amm Nitrate, Organic, SO_4^{2-})

Mission Scientist's Log

Flight No B 431 **Date** 26/2/09 **Name** K.N. Bower **Page** 3 **of** 8

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
					Chilbolton - update (Screen Dump)
					Deep Ice Cloud 2-7km (6.5 - 23 kft)
					Thin Cirus 8-10 km (26.2 - 32 kft)
					RHI ⇒ thins out to West - strong midlevel atts 100km
11.02.29	Ferry/P2	2.1kft	228	50°48'/2°48'	2500ft/936 mbar, 2.42°/-1.68° 10m/s/287
					Chilbolton Update 2:
					dry slot Ci - Mid level.
					(deepens) 8-10km (26.2 - 32 kft)
					mid level (Tmin 5.5 - 6 km (18 - 19.5 kft)
					CB = 2.5km (8.2 kft)
					(more CH - all above) but it is
					thickening 45-60 km out from CH.
					- Will check out layers in the profile
11.09.20	P2	FL9000ft	66°	50°54'/2°12'	724 mb, -2.07/-6.85°C, 19m/s/298 mb
					CPI seeing ice now.
11.10.14	P2	FL10000ft	69	51°0'/2°6'	695 mb -4.28°/-5.8°C 16m/s/311 mb.
					RADSEARCH :-
					CB = 2500 m (8.2 kft)
					CT. = 5.5-6 km (18-19.6 kft)
					(via supercooled liquid)
11.12.13	P2	FL120	68	51°0'/1°54'	645 mb -8.74°/-10.83°C 18 m/s/308°
11.13.19	P2	FL131	88	51°0/1°42'	A/C Anti Icing - detects icing 614mb -11.06/-9.0°C
					CPI - mixed phase
11.13.10	P2	FL149	271	50°54'/1°42'	5000ft/572 -13.17°/-12.1° 24m/s/302°

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Flight No B. 431 **Date** 26/2/09 **Name** K.N. Bower **Page** 4 **of** 8

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
11.16.18	P2	FL 16.1 kft	246	51°0/1°48'	545 mb / −15.24°C/−13.65°C 26m/s/306°
~~11.16.19~~	P2	FL 17.5 kft			
					Very bright nose – near CT ???
11.19.06	P2	FL 18.6kft	256	51°0/2°6'	492 mb/ −20.6°/−18.62°C 23 m/s/302°
11.19.40	P2	FL 19.0kft	261	50°54/2°12'	483 mb −21.57°/−19.53°C 25 m/s/304°
11.20.10	P2	FL 19.5kft	265	" / "	CT. 474 mb −22.04°/−19.76°C 28 m/s/310°
11.21.56	P2end/P3	FL210	262	50°54/2°24'	20.9 kft / 446 mb, −25.15°/−23.88°C 29m/s/312°
11.24.13	P3end/R2	FL190	262	50°54/2°42'	484 mb −20.86°/−18.64°C 26 m/s/312°
					Report² Radsearch – Inbound 19.0 kft.
					CH ⇒ 6000 m SC layer (19.6 kft)
					Hard ice layer
					CB 2000 m (6.5 kft)
					Ci – 8–9 km
					[TWC – Weak MD mesoscale – mid level
					persists to 1500, breaking/dissipating by 1800Z]
11.34.04	R2	FL190	64	51°0/1°42'	Above CT. but CPI some stuff !! 484 mb
					−20.57°/−20.26°, Core Cloud Q) B Rosetts?
					MSA Q) to CC – Water??
					Small vreg, water, column, bullets rosettes.
[CH] 11.36.11	R2end	FL190	64	51°6'/1°24'	ON CH, 484 mb −20.93°/−20.19°C 28m/s/320°
11.37.32	Turn at	FL190	52	51°6'/1°12'	484 mb, −21.0°/−20.37°C 28 m/s/320°
	PEPYS.				(Ice on probes – little thinner than before)
					– lidar – layer – Full streaks 3.5–4 km @
					80 km West CH.
					+30 dbz 8–6 km alt (6.5 – 19.7 kft)

+10 dbz Peak – still ice – streaks thin RHI strong return ice streaks

poss levels: 190 160 130 100 70
for runs 180 150 120 90 80
170 140 110 80

Mission Scientist's Log

Flight No B.431. **Date** 26/2/09 **Name** K.N. BOWER **Page** 5 **of** 8

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
[N CH] 11.41.46	P3&2	FL190	277	51°6'/1°24	484mb -20.48/-21.13 29m/s/313°
← 11.43.03	P3/R3	FL180	262	51°6'/1°30	505mb, -18.52/-18.78°C 27m/s/306°
	R3	FL180			Encoded LW but.....
					Cirr Cloud cross w/c - ice + water
					CPI - disputes presence LW. !
					no icing detected by a/c anti icing either.
					Chilbolton reports:-
					Lots of specular reflection around -
					LW tops -20°C plus.
					evidence of intermittent seeding from above
					PMS - evaporating ice. ?
					0-20km West
					Some Colored H_2O in full streaks.
					~ 3.5km poss something to do with
					waves.
← 11.49.04	R3	FL180	263	51°0/2°6'	been out of cloud for a while now.....
					- but CPI reports ppt from above so will continue R3
← 11.51.47	R3	FL180	262	50°54'/2°24'	Into Cloud again - a/c anti icing detecting ice
					CPI - water (505mb -19.23°/-16.98° 24m/s/303°)
					2DC - particles.
C 11.54.47	R3 E/P4	FL180	291	50°54'/2°42'	505mb -18.85°/-16.94°C 25m/s/311°
					CPI - droplet radius increased across left cloud!
					was $<10_{\mu m}$ → $>10_{\mu m}$
					FSSP - LWC peaked at ~ $0.3 g/m^3$
					now ~ $0.1 g/m^3$

Mission Scientist's Log

Flight No B.431 **Date** 26/2/09 **Name** K. N. Bower **Page** 6 **of** 8

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
11.56.00	Prof/R4	FL170	76°	50°54'/2°42'	526mb −17.83°C/−15.24°C 22mb/317° (still manoeuvring)
					5mm ice on port pylon now
					Radcorah :-
				✱✱✱	Core Cloud - lot of things gone to zero ✱✱✱
					— 2DC - iced up. ? — red screen !!
					— other probes → 0 too
11.59.09	R4	FL170	63	50°54/2°18'	(Heavy icing on a/c + engines - sync lost)
					- ice along leading edges of wings too
					MSc 2 - wants to descend to de-ice
					- Cloud incredible through
					4km - real cloud deck until 17.00
					descent - continue/descend... our probes still working
11.59.09	R4	FL170	63	50°54/2°14'	526mb −18.19°C/−15.67°C, 20mb/307°
12.00.50	R4	FL170	64	51°0/2°6'	out of CT 526mb −17.04°/−15.82° (30/324°)?
12.02.16.	R4	FL170	66	51°0/1°54'	back in Cloud 526mb −17.88°/−15.82° (45/334)?
[CH] 12.06.31	R4	FL170	63	51°6'/1°24'	OH CH 526mb −17.14°/−16.44 (56/355)?
					CH- thick layer ice (Ci seeding mid level clouds)
					ice 6-7 km - falling out mid level.
					thunder 5-6 km (16.5-19.5 kft)
					base 1 km (3.3kft)
					SC tops 3 km 10 kft
					MSii -
[↑CH] 12.11.52	R4cont/PS	FL170	267	51°6'/1°24'	526mb, −17.15°C/−16.21°C 28/250°
← 12.13.13	PScont/PS	FL160	266	51°6/1°30'	547mb, −15.16°C/−14.86°C 29/289°

Mission Scientist's Log

Flight No B...431... **Date** ...26/02/09... **Name** ...K. N. BOWER... **Page** ...7... **of** ...8...

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
12.15.58	RS	FL160	262	51°0/1°48'	Above CT now 548mb -15.04°/-14.53° (291/240)?
					lots of small irregulars - prob not LW though
					and some larger ice Xbols.
					Cvr Cloud - 2DC - saw droplets -
					(but a/c not detecting veins !!)
12.18.02	RS	FL160	261	51°0/2°0	Back in cloud 548mb, -15.57°/-13.95 23/282
12.21.47	RS	FL160	261	50°54'/2°24'	CPI - Flew through a bag full LW then...
12.21.47					548mb -15.48°C/-13.40°C 21m/s/283deg.
					CPI - Ice built up - lots.
					PCASP - Iam Ice on it.
					Certain - leading edge of pylon horn
12.29.42 [SW]	RSE/P6	FL160	262.	50°54'/2°36'	548mb -15.41°C/-13.02°C 20m/s/281°
					2½ hrs - Chalktun sample bell feature.
					3km feature - 10 kft.
					Flight Manager ....
12.25.43	P6/R6	FL150	358	50°54'/2°42'	570mb -12.94°/-11.08 24m/s/322°
	(started going West)				CB - lifted to 20000m now.
					Top of ice layer ~7000m (23kft)
					pass through out to west
					but CB remaining as go West
					- No obvious pot seen.
					(Freezing level 7000 ft earlier)??
12.26.18	R6	FL150	65	50°54'/2°42'	left turn - ATC → back to own navigation
12.26.59	R6	FL150	73	50°54/2°36'	570mb, -12.98°C/-11.63°C 16m/s/323°
12.32.19	R6	FL150	64	51°0/2°0'	Out of cloud here 571mb -12.9°C/-12.35°C

Mission Scientist's Log

Flight No B. 431 **Date** 26/02/09 **Name** K.N. Bower **Page** 8 **of** 8

Time (GMT)	Run / Profile	Height	Hdg	GPS Position	Remarks / Observations (cloud type & amount in oktas, weather, visibility, winds, sea state etc.) eg Cirrus 2/8, StratoCu 3/8, hazy, wind 240°/24kts
12.34.50	R6	FL150	65	51°0/1°36'	In cloud 571mb -13.43°C/-11.3°C (turb from)
					Both edge Mid level cloud.....
					—
					Steady mid level SC leg
					8.5 hrs (28Nft)
					RTN ⇒ out to 20 hrs
					Hymd at 3 hrs (9.8Nft)
[CH] 12:37.05	R6	FL150	66	51°6'/1°24'	OH OH 571mb -12.59/-12.47°C (44mb/330 local up)
					2DS - lost it just now.
12.43.01	Start Descent	FL150	266	51°6'/1°24	Fast descent to remain/mid lvl 571mb -12.72/-79.
12.44.45	Descent	11.4Nft	252	51°0/1°36'	CB, 659mb -8.01°C/-79.91°C
↑		↑			(36mb/223°)
					Lost 230V power - every instrument.
(maybe not OK	Horace	maybe displays	lost here.)		ie FSSP
					Hurrac.
					Cloc Chem etc.
					Martin Dorling advised :-
					Circuit breaker - 5Amp popped
					Ask Captain to reset - Yes
					But popped again - so RTB
1.23.24	KNB				Landed

B431 Xchat log

*** Opened channel log for #APPCLOUDS at 26/02/2009 10:58:38
[10:59] [FAAM_GLUXE] test
[11:09] [FAAM_GLUXE] Hi Tom, the decision for 1 or 2 flights will be made at 12:00
[11:11] [FAAM_GLUXE] Jim, you took off with the instructions! The $B431.txt log file isn't logging properly. Some messages are missing.
[11:16] <FAAMOpsCran> Can Keith give DFL Ops an idea of the area they wish to fly in for wave clouds tomorrow. N of Glasgow is a bit vague for flight planning purposes. Also. Refuel may be Prestwick rather than Teeside depending on area
[11:17] <FAAMOpsCran> I think the log file doesn't properly update until you close the session (based on my minimal experience).
[11:18] [FAAM_GLUXE] Please book area Charlie as main and Bravo as backup for tomorrow's flight
[11:19] [FAAM_GLUXE] Captain suggests Newcastle or Teeside as refuel options for tomorrow
[11:23] [FAAM_GLUXE] Doug can you confirm you passed on info ref tomoro & Sat to Helen?
*** Closed channel log for #APPCLOUDS at 26/02/2009 11:27:03
*** Opened channel log for #APPCLOUDS at 26/02/2009 11:27:05
[11:27] [FAAM_GLUXE] test again
[11:27] <TomC> Latest met O meso has middle level cloud persisting until after 3 pm but breaking over your area before 6 pm
[11:29] <JimCR_FAAM> Doug has spoken to Helen, they will try to do both but Saturday is better timewise
[11:30] [FAAM_GLUXE] Tom, do you want us to stay on study untill 1430 or do a refuel?
[11:31] <ChilboltonObser> lidar is seeing patchy liquid embedded in the ice fall streaks at 3500-4000m. RHI shows a very strong return from ice streaks approx 80km W Chilbolton +30dBZ over 2-6km altitude. Closer in more like +10dBZ peak, still fair ice content though + optically thick
[11:33] <JimCR_FAAM> Stephane, the instructions don't have any more instructions about logging. Best bet is to surf the config files but note Doug's comment above
[11:45] [FAAM_GLUXE] Jim, have you found a way to copy/paste the messages? Am trying to feed Chilbolton's updates to Mission Scientist via Core1 server, to reduce radio traffic.
[11:46] <ChilboltonObser> lots of specular reflection from oriented plate crystals in vertical lidar data, estimate liquid top approx -20C so seems sensible. Some evidence of intermittent seeding of altostratus from cirrus above on latest overhead cloud radar data. RHIs show some interesting waves in evaporating ice virga 0-20km W Chilbolton.
[11:49] <ChilboltonObser> supercooled liquid embedded in ice streaks now quite persistent, approx 3500m altitude, sloping gently - maybe something to do with the waves...
[11:51] [FAAM_GLUXE] Hi Tom,
[11:51] *** FAAMOpsDoug (~vircuser@host86-153-16-34.range86-153.btcentralplus.com) has joined #APPCLOUDS
[11:52] [FAAM_GLUXE] Tom, have you made a decision re. staying on area till 14:30 or landing/refuel to extend study?
[11:52] <FAAMOpsDoug> Doug now on this ID, Guy on FAAMOpsCran
[11:55] <ChilboltonObser> From our point of view at Chilbolton the clouds are incredible here now - plane has only done 2 runs so far - seems like best thing is to keep sampling conditions we have til 2.30. What do you reckon?
[11:57] <FAAMOpsDoug> From Dave K : Wx Situation much the same as briefed earlier; 09z 4 km MO model shows medium cloud clear of Chilbo area by about 1700. Their decision on A/C based on what they can see, & info being fed from Tom C + Chilbo radar (for 2 flights or 1).
[12:05] <FAAMOpsDoug> Have Vizand IR pics from Dave K. Not sure if they can be transferred here. Can put on FAAM site and send link if req. Nice wave cloud on them over Bonnie Scotland...
[12:05] [FAAM_GLUXE] Doug, please pass to DFL-ops decision is only one flight today. Pass on to Cranfiel ATC please
[12:09] <TomC> Sorry I was in a meting , one flight is indeed correct decision
[12:11] <FAAMOpsDoug> OPs informed of 1 flt. Refuel tomorrow at Prestwick as Newcastle busy time and Teeside have h&S issue that would cut science power
[12:12] <FAAMOpsCran> DFL ops informed of only one flight today. Do you have an ETA?
[12:12] <FAAMOpsDoug> ETA approx 3.40?
[12:16] [FAAM_GLUXE] Chilbolton, what is your preference for the rest of the mission: a) keep sampling the supercooled high altitude feature or b) come down beloew cloud to sample lower features?
[12:18] [FAAM_GLUXE] Doug, ETA is 1515
[12:21] <ChilboltonObser> Assuming we have about 2.5 hrs left, can we sample both? maybe work way up/down in steps; would be good to sample feature at 3000m though, we have a good view of this from lidars.
[12:23] <ChilboltonObser> what do you think?
[12:24] [FAAM_GLUXE] Keith thinking about it. Standby
[12:32] <TomC> back edge of middle level cloud central Wales moving SE
[12:36] <ChilboltonObser> quite a bit of seeding of mid-level supercooled layer by overlying cirrus (top from radar 8500m) at the moment; RHI indicates this is case out to 20km or so. Liquid at 3000m seems to have disappeared overhead.
[12:41] *** DFL_Ops (~vircuser@host86-153-16-34.range86-153.btcentralplus.com) has joined #APPCLOUDS
[12:41] <DFL_Ops> DFL Ops now have the software set up
[12:44] [FAAM_GLUXE] Jim, we've lost 230Vac on the console rack. Horace now running on UPS battery. Mo looking around to troubleshoot. Any suggestion?
[12:46] <DFL_Ops> EGTC 261220Z 26018KT 9999 FEW016 07/03 Q1023=
[12:46] <DFL_Ops> TAF EGTC 261101Z 2612/2621 25014KT 9999 SCT018 PROB40 TEMPO 2612/2617 27015G25KT=
[12:46] <DFL_Ops>
[12:46] <DFL_Ops> METAR EGNX 261220Z 24011KT 9999 FEW030 07/03 Q1022=
[12:46] <DFL_Ops> TAF EGNX 261102Z 2612/2712 27013KT 9999 SCT032 TEMPO 2620/2623 7000 -RADZ BKN012 PROB30 TEMPO 2622/2710 4000 BR BKN005=
[12:49] <JimCR_FAAM> Is that ALL the 230V I assume you have checked both SSP outlet breakers

[12:50] <DFL_Ops> nice
[12:50] <JimCR_FAAM> video units on the fwd console all all non ups powered - presumably they are dead
[12:52] [FAAM_GLUXE] Hi Jim, Mo on the case after talking to Martin/Avalon. 230V CB popped and took most of the 230V on the galley
[12:53] <JimCR_FAAM> which 230V breaker? ours or aircraft?
[12:53] [FAAM_GLUXE] No good, the Conv Ctrl CB popped as soon as it was remade so we're on our way home
[12:54] [FAAM_GLUXE] Hi folks, in case you're picking up this thread, the flight is ABORTED.
[12:57] [FAAM_GLUXE] DFL-ops please ackownledge ETA is 13:30. Thanks
[12:57] <FAAMOpsDoug> Doug will pass to DFL ETA
[12:58] <ChilboltonObser> OK - very frustrating, conditions are so good! I assume it won't be possible to fix & come back for a second attempt today?
[13:00] <DFL_Ops> yes we have the new eta
[13:02] [FAAM_GLUXE] Chilbolton, it depends what fault it is. Keith will confirm after landing/fault evaluation.
[13:07] <ChilboltonObser> OK - we will stay at Chilbolton until we hear from you.
[13:09] *** FAAMOpsDoug (~vircuser@host86-153-16-34.range86-153.btcentralplus.com) has quit IRC [Quit: User pushed the X - because it's Xtra, baby]
[13:10] *** FAAMOpsDoug (~vircuser@host86-153-16-34.range86-153.btcentralplus.com) has joined #APPCLOUDS
[13:13] [FAAM_GLUXE] Doug - message for Martin, Avalon. We switched all the instruments off which use 230V, including SSP CBs. Made the Conv Ctrl CB but it immediately popped.
[13:20] <FAAMOpsDoug> Told Martin, Conv CTRL is problem, could replace in flight if you fancy getting outside the plane!
[13:21] [FAAM_GLUXE] we've only got the cloud physics PC/monitor working here!
[13:21] <TomC> Is it possible top replace and then take-off again ?
[13:24] <FAAMOpsCran> I doubt that can be answered until Avalon have looked at the aircraft
[13:25] <FAAMOpsDoug> I think it may be possible, depends on the spare working and any tests that have to be done.
[13:33] [FAAM_GLUXE] Chilbolton,
[13:34] [FAAM_GLUXE] Chilbolton, if the prob can be fixed we'll t/o again at 14:30. please standby
[13:34] *** Server connection lost
[13:34] *** Server connection lost
[13:34] *** Server connection lost
*** Closed channel log for #APPCLOUDS at 26/02/2009 13:34:39

P.S.A.P. Log

Flight No. **B431** Date 26/02/2009 Page 1 of 1 operator

GMT	Filter Trans.	Flow Rate	B_a x 10^{-6}	Ph_det levels		Run	Remarks
Set to DRS time: done 0845Z	New filter Tr = 1.000 done	Set to 3.0 lpm: N/A	.0	17	45	Ave =30 s	←Preflight

Flight No: B431 **Date: 26/02/2009** **Operator:D.Tiddeman**

Type of filters mounted in	Upper inlet:	Lower inlet:

Disk No 1 (top)	Disk No 2 (middle)	Disk No 3 (bottom)	Inlet Upper/ Lower	Time Pump On	Time Pump Off	Run	Accum Vol [l]	Comments eg. Filter Exposure No, period in cloud, change of level etc.
7	8	117	U	10:39:50	11:03:01	Run1	1281	Started in profile descent continued to run 1 some cloud

Flight: B431

KEY

- Not Fitted
- Fitted, Not Operated
- Duff Data
- Minor Problem
- OK

Thermometers
- Cabin Temperature:
- Heimann:
- Deiced Temp:
- Non-deiced Temp:

Hygrometers
- FWVS:
- Buck CR2:
- General Eastern:
- Johnson Williams:
- Nevzorov:
- Total Water Probe:

Cameras
- Downward Facing:
- Forward Facing:
- Rearward Facing:
- Upward Facing:

Navigation + Aircraft
- Cruciform GPS:
- GIN Applanix:
- INU Honeywell:
- Radar Altimeter:
- RVSM IAS:
- RVSM Static Pressure:
- XR5 GPS:

Misc Core
- HORACE:
- AMTG:
- AVAPS:
- Cabin Pressure:
- Printer:
- S9 Static Pressure:
- Satcom C:
- Satcom H (VIRC):
- Turb Centre-Static:
- Turb Left Right:
- Turb Up-Down:
- Turb Horizontal Chk:
- Turb Vertical Chk:
- Weather Radar:

DLUs:
- DLU AERACK:
- DLU BBR Lower:
- DLU BBR Upper:
- DLU Core Chem:
- DLU Core Consoles:
- DLU Port Aft:
- DLU Port Fwd:
- DLU Stbd Fwd:

Radiometers
Lower:
- BBR (clear) Lower:
- BBR (IR) Lower:
- BBR (red) Lower:

Upper:
- BBR (clear) Upper:
- BBR (IR) Upper:
- BBR (red) Upper:

- ARIES:
- DEIMOS:
- IR Camera:
- JNO2 Lower:
- JNO2 Upper:
- JO1D Lower:
- JO1D Upper:
- MARSS:
- SHIMS Lower:
- SHIMS Upper:
- SWS:
- TAFTS:

Cloud Probes
- 2DC:
- 2DP:
- FFSSP:
- PCASP:
- PCASP SPP-200:
- 2DS:
- ADA:
- CAPS:
- CCN:
- CDP (fuselage):
- CDP (Canister):
- CIP 100 (PIP):
- CIP 25 (CIP):
- CPI:
- CVI (Inlet):
- CVI PCASP-X:
- CVI Ly-A Hygro:
- FSSP (UMan):
- SID1:
- SID2:
- SID3:

Aerosol
- CPC 3025A:
- CPC 3786 H2O:
- Filters 47mm:
- Filters 90mm:
- Neph - Dry:
- Neph - Wet:
- PSAP:
- AMS:
- CPC (AMS):
- SMPS (AMS):
- CPC 3010A (CVI):
- INC:
- Mini-LIDAR:
- SP2:
- UHSAS:
- VACC:

Chemistry
- CO Aerolaser 5002:
- NOx TE42C:
- Ozone TE49C:
- Ozone TE49:
- SO2 TE43C:
- TDLAS (NIR) CH4:
- TDLAS (NIR) CO2:
- FAGE:
- Formaldehyde:
- NOx FAAM:
- NOxy:
- ORAC:
- PAN:
- PERCA:
- Peroxide:
- PTRMS:
- TDLAS (1C):
- WAS Bags:
- WAS Bottles:

Misc Non-Core
- CASI/ATM:
- LIDAR (big):
- LTI:
- SAW Hygrometer:

Report Created 15/09/2009 14:28:02

Last Updated: 26/02/2009 18:31:23

Faults / Incidents Log

Flight No. B431
Date: 26/02/09

Instruments

1. WAS – nitrogen cylinder found to be empty – refilled on pre-flight
2. Printer – only 2 sheets of paper in tray….ran out in flight.
3. Nephelometer – usual problems establishing comms on the pre-flight. Only Wet Neph on serial link to laptop.
4. Water bottles not topped up
5. Turb Probe – AOA & AOSS diff channels iced up at 1158

As result of 230V dropout

6. AMS filament blown

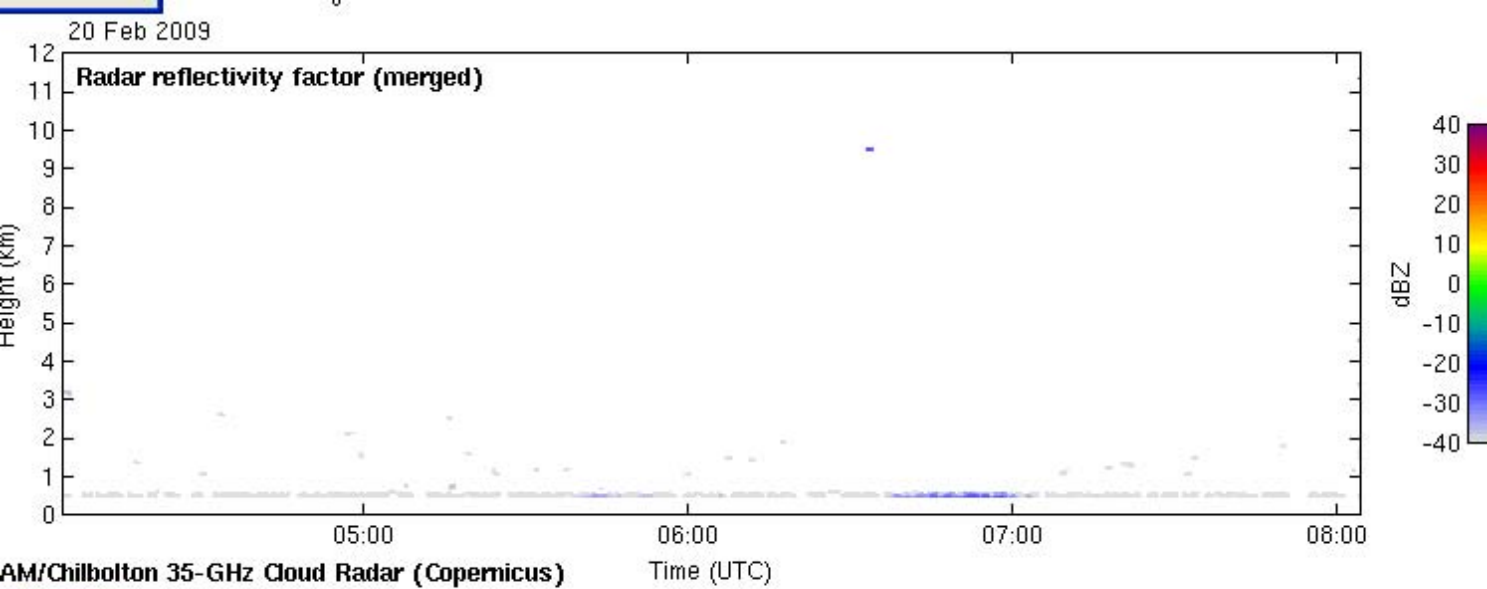
Issues

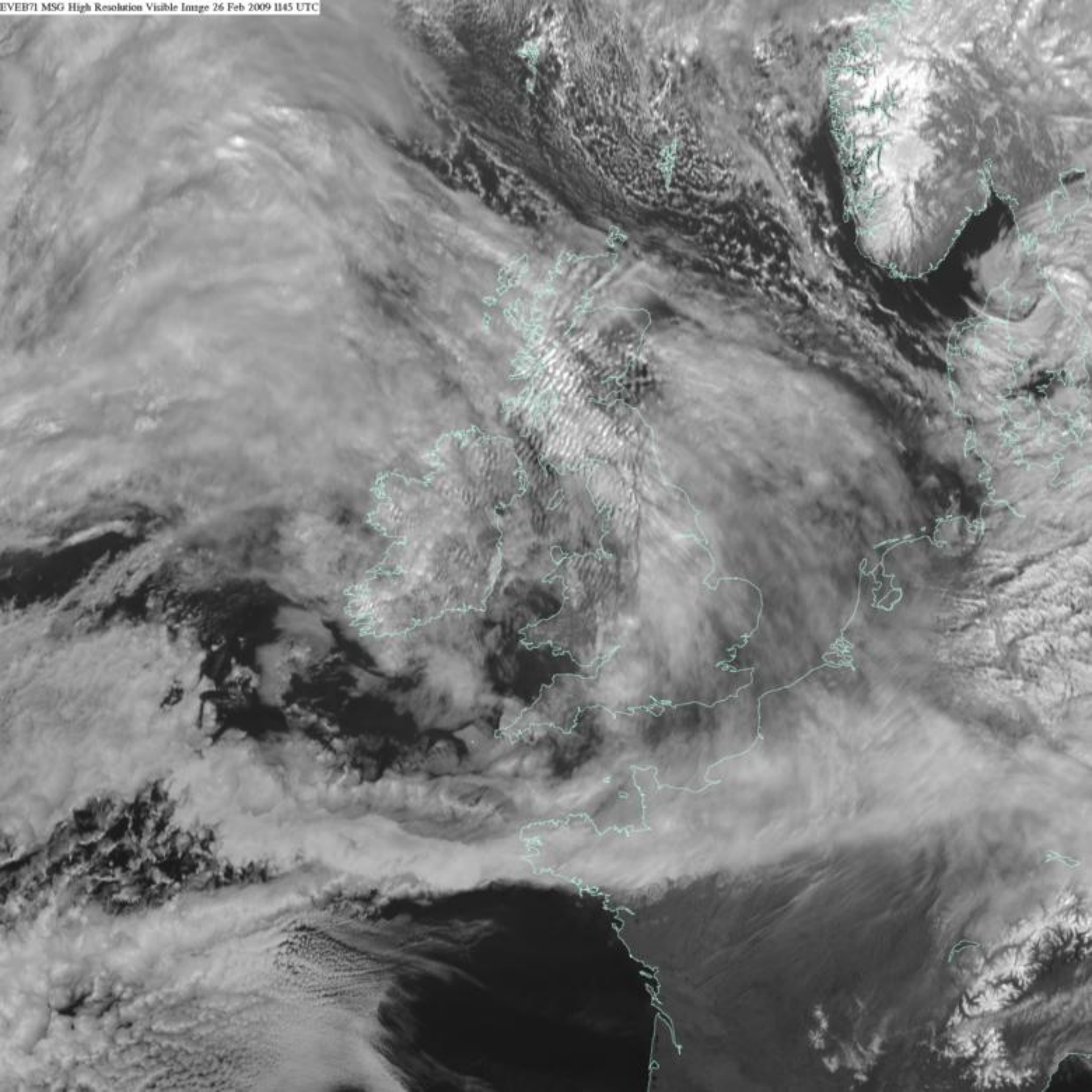
1. 230V science supply dropped out at 1239. Conv Ctrl CB popped on forward CB panel (right of Mission Scientist). Tried remaking CB, popped immediately. Switched all kit on 230V supply off, broke all SSP 230V CBs. Tried making Conv Ctrl CB again, it popped immediately. Return to base.

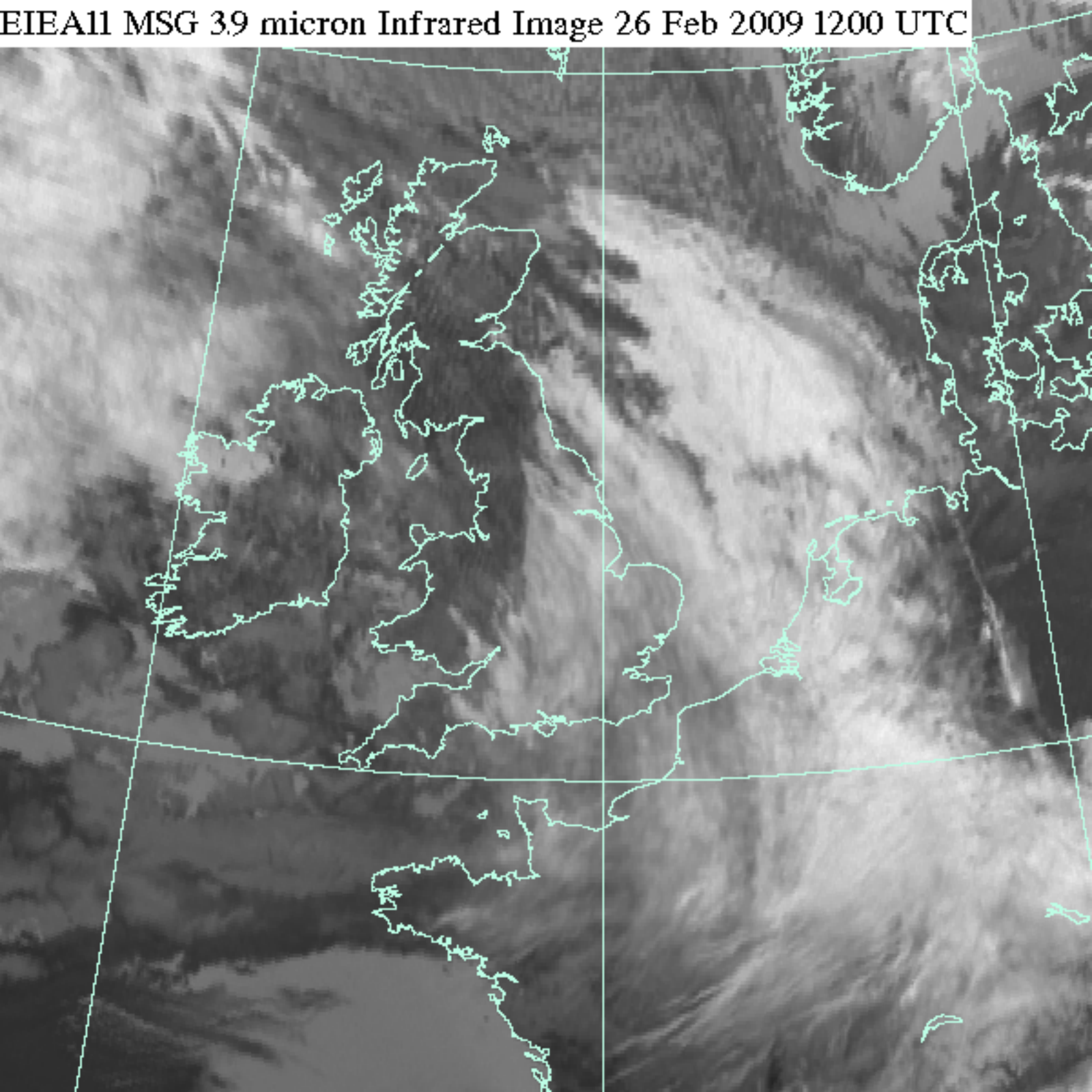
Wet Nephelometer Log

Flight No **B431** Date 26 Feb 2009 Operator's name Dave Tiddeman Page 1 of

GMT	Run	Height	Sample flow	Dry neph RH	Wet neph RH	Temp ramp	T_{water}	Remarks
1035						10		chiller switched on
104140		2000	10.1	-	41.5	40	12	Dry neph not talking to laptop
105449	run1	2000	10.5	-	84.5	40	40	
111004		10000	12.5	-	90.5	40	40	Chiller off


20 Feb 2009
Radar reflectivity factor (merged)
Height (km)
12
11
10
9
8
7
6
5
4
3
2
1
0
05:00
06:00
07:00
08:00
Time (UTC)
dBZ
40
30
20
10
0
-10
-20
-30
-40
AM/Chilbolton 35-GHz Cloud Radar (Copernicus)
day


EVEB71 MSG High Resolution Visible Image 26 Feb 2009 1145 UTC


EIEA11 MSG 3.9 micron Infrared Image 26 Feb 2009 1200 UTC